

Small Business Innovation Research

FY 2002

NOAA PROGRAM SOLICITATION

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U.S. DEPARTMENT OF COMMERCE

http://www.oar.noaa.gov/ORTA/SBIR

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U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

PROGRAM SOLICITATION FOR SMALL BUSINESS INNOVATION RESEARCH

1.0 PROGRAM DESCRIPTION

1.1 Introduction

The Department of Commerce (DOC) National Oceanic and Atmospheric Administration (NOAA) invites small businesses to submit research proposals under this solicitation. Firms with strong research capabilities in any of the areas listed in Section 8 of this solicitation are encouraged to participate. **Unsolicited proposals are not accepted under the Small Business Innovation Research (SBIR) program**.

Objectives of this program include stimulating technological innovation in the private sector and strengthening the role of small business in meeting Federal research and development (R&D) needs. This program also seeks to increase the commercial application of innovations derived from Federal research and to foster and encourage participation by socially and economically disadvantaged and woman-owned small businesses.

1.2 Three-Phase Program

The "Small Business Innovation Research Program Reauthorization Act of 2000" requires the Department of Commerce to establish a three-phase SBIR program by reserving a percentage of its extramural R&D budget to be awarded to small business concerns for innovation research.

The funding vehicles for NOAA's SBIR program in both Phase 1 and Phase 2 are contracts. This document solicits Phase 1 proposals only.

NOAA has the unilateral right to select SBIR research topics and awardees in both Phase 1 and Phase 2, and to award several or no contracts under a given subtopic.

1.2.1 Phase 1 - Feasibility Research

The purpose of Phase 1 is to determine the technical feasibility of the proposed research and the quality of performance of the small business concern receiving an award. Therefore, the proposal should concentrate on research that will significantly contribute to proving the feasibility of the proposed research, a prerequisite to further support in Phase 2.

1.2.2 Phase 2 - Research and Development

Only firms that are awarded Phase 1 contracts under this solicitation will be given the opportunity of submitting a Phase 2 proposal immediately following completion of Phase 1. Phase 2 is the R&D or prototype development phase. It will require a comprehensive proposal outlining the research in detail and a plan to commercialize the final product. Each Phase 2 applicant will be required to provide information for the Tech-Net Database System (http://technet.sba.gov), when advised this system can accept their input.

Further information regarding Phase 2 proposal requirements will be provided to all firms receiving Phase 1 contracts

1.2.3 Phase 3 - Commercialization

In Phase 3, it is intended that non-SBIR capital be used by the small business to pursue commercial applications of Phase 2.

1.3 Eligibility

Each organization submitting a proposal **must** qualify as a small business (Section 2.1) for research or R&D purposes (Section 2.2) at the time of the award. In addition, the primary employment of the principal investigator must be with the small business at the time of the award and during the conduct of the research. More than one-half of the principal investigator's time must be spent with the small business for the period covered by the award. **Primary employment with a small business precludes full-time employment with another organization. Deviation from these requirements must be approved by the program manager in consultation with the contracting officer.**

Also, for both Phase 1 and Phase 2, the work must be performed in the United States. "United States" means the fifty states, the territories and possessions of the United States, the Commonwealth of Puerto Rico, the District of Columbia, the Republic of the Marshall Islands, the Federated States of Micronesia, and the Republic of Palau. The program manager in consultation with the contracting officer may approve exceptions to this requirement.

Joint ventures and limited partnerships are eligible, provided the entity created qualifies as a small business as defined in this solicitation. Consultative arrangements between firms and universities or other non-profit organizations are encouraged, with the small business serving as the prime contractor.

1.4 Contact with NOAA

In the interest of competitive fairness, oral or written communication with NOAA or any of its components concerning additional information on the technical topics described in

Section 8 of this solicitation is prohibited.

Requests for general information on the NOAA SBIR program may be addressed to:

Dr. Joseph M. Bishop, NOAA SBIR Program Manager 1335 East-West Highway, Silver Spring, MD 20910-3284 Telephone: (301) 713-3565, Fax: (301) 713-4100,

E-mail: joseph.bishop@noaa.gov

Information sources are listed in Section 7

2.0 DEFINITIONS

2.1 Small Business Concern

A small business concern is one that, at the time of award for Phase 1 and Phase 2:

- (a) is independently owned and operated, is organized for profit, is not dominant in the field of operation in which it is proposing, and has its principal place of business located in the United States (Section 1.3);
- is at least 51 percent owned, or in the case of a publicly owned business, at least 51 percent of its voting stock is owned by United States citizens or lawfully admitted permanent resident aliens; and
- (c) has, including its affiliates, a number of employees not exceeding 500, and meets the other small business regulatory requirements found in 13 Code of Federal Regulations Part 121. Business concerns are affiliates of one another when, either directly or indirectly, (1) one concern controls or has the power to control the other, or (2) a third party controls both. Control can be exercised through common ownership, common management, and contractual relationships. Business concerns include, but are not limited to, any individual, partnership, joint venture, association, or cooperative.

2.2 Research or Research and Development

Any activity that is (a) a systematic, intensive study directed toward greater knowledge or understanding of the subject studied; (b) a systematic study directed specifically toward applying new knowledge to meet a recognized need; or (c) a systematic application of knowledge toward the production of useful materials, devices, systems, or methods, and includes design, development, and improvement of prototypes and new processes to meet specific requirements.

In general, the NOAA SBIR program will fund Phase 1 and 2 proposals with objectives that can be defined by (b) and (c) above.

2.3 Socially and Economically Disadvantaged Small Business Concern

Is one that is:

- (a) at least 51 percent owned by (1) an American Indian tribe or a native Hawaiian organization, or (2) one or more socially and economically disadvantaged individuals, and
- (b) controlled by one or more such individuals in its management and daily business operations.

A socially and economically disadvantaged individual is defined as a member of any of the following groups: Black Americans, Hispanic Americans, Native Americans, Asian-Pacific Americans, Subcontinent Asian Americans, or any other individual found to be socially and economically disadvantaged by the Small Business Administration (SBA) pursuant to Section 8(a) of the Small Business Act, 15 U.S. Code (U.S.C.) 637(a).

2.4 Women-Owned Small Business

A small business that is at least 51 percent owned by a woman or women who also control (meaning to exercise the power to make policy decisions) and operate (meaning being actively involved in the day-to-day management) the small business.

2.5 Funding Agreement

The funding vehicles for NOAA's SBIR program in Phase 1 and Phase 2 are contracts.

2.6 Subcontract

This is any agreement, other than one involving an employer-employee relationship, entered into by a Federal Government funding awardee, calling for supplies or services required solely for the performance of the original funding agreement.

2.7 Commercialization

This is locating or developing markets and producing and delivering products or services for sale (whether by the originating party or by others). As used here, commercialization includes both Government and private sector markets.

3.0 PROPOSAL PREPARATION INSTRUCTIONS AND REQUIREMENTS

3.1 Proposal Requirements

The objective is to provide sufficient information to demonstrate that the proposed work represents a sound approach to the investigation of an important scientific or

engineering innovation worthy of support. The proposal must meet all the requirements of the subtopic in Section 8 to which it applies. A proposal must be self-contained and written with all the care and thoroughness of a scientific paper submitted for publication. It should indicate a thorough knowledge of the current status of research in the subtopic area addressed by the proposal. A proposal will not be deemed acceptable if it represents presently available technology. Each proposal should be checked carefully by the offeror to ensure inclusion of all essential material needed for a complete evaluation. The proposal will be peer reviewed as a scientific paper (all units of measurement should be in the metric system).

NOAA reserves the right not to submit to technical review any proposal which it finds to have insufficient scientific and technical information, or one which fails to comply with the administrative procedures as outlined on the Checklist of Requirements in Section 9.

The proposal must not only be responsive to the specific NOAA program interests described in Section 8 of the solicitation, but also serve as the basis for technological innovation leading to **new commercial products**, **processes**, **or services**. An organization may submit different proposals on different subtopics or different proposals on the same subtopic under this solicitation. When the proposed innovation applies to more than one subtopic, the offeror must choose that subtopic which is most relevant to the offeror's technical concept.

Proposals principally for the commercialization of proven concepts or for market research must not be submitted for Phase 1 funding, since such efforts are considered the responsibility of the private sector.

The proposal should be direct, concise, and informative. Promotional and other material not related to the project shall be omitted. **The Phase 1 proposal must provide a description of potential commercial applications.**

3.2 Phase 1 Proposal Limitations

- Page Length no more than 25 pages, consecutively numbered, including the cover page, project summary, main text, references, resumes, any other enclosures or attachments, and the proposal summary budget.
- <u>Paper Size</u> must be 21.6 cm X 27.9 cm (8 ½" X 11").
- Print Size must be easy to read with a fixed pitch font of 12 or fewer characters per inch or proportionally spaced font of point size 10 or larger with no more than 6 lines per inch. Margins should be at least 2.5cm.

Supplementary material, revisions, substitutions, audio or video tapes, or computer floppy disks will **not** be accepted.

Proposals not meeting these requirements will be returned without review.

3.3 Phase 1 Proposal Format

3.3.1 Cover Sheet

Complete Section 9 "Cover Page" as page 1 of each copy of each proposal. **NO OTHER COVER WILL BE ACCEPTED.** Xerox copies are permitted.

3.3.2 Project Summary

Complete Section 9 "Project Summary" as page 2 of your proposal. The technical abstract should include a brief description of the problem or opportunity, the innovation, project objectives, and technical approach.

In summarizing anticipated results, include technical implications of the approach (for both Phase 1 and 2) and the potential commercial applications of the research. The Project Summary of proposals that received an award will be published by NOAA and, therefore, must not contain proprietary information.

3.3.3 Technical Content

Beginning on page 3 of the proposal, include the following items with headings as shown:

- (a) Identification and Significance of the Problem or Opportunity. Make a clear statement of the specific research problem or opportunity addressed, its innovativeness, commercial potential, and why it is important. Show how it applies to a specific subtopic in Section 8.
- (b) **Phase 1 Technical Objectives.** State the specific objectives of the Phase 1 effort, including the technical questions it will try to answer to determine the feasibility of the proposed approach.
- (c) Phase 1 Work Plan. Include a detailed description of the Phase 1 R&D plan. The plan should indicate not only what will be done, but where it will be done, and how the R&D will be carried out. The methods planned to achieve each objective or task should be discussed in detail. This section should be at least one-third of the proposal.
- (d) **Related Research or R&D.** Describe research or R&D that is directly related to the proposal, including any conducted by the principal

investigator or by the proposer's firm. Describe how it relates to the proposed effort, and describe any planned coordination with outside sources. The purpose of this section is to persuade reviewers of the proposer's awareness of recent development in the specific topic area and assure them that the proposed research represents technology presently not available in the marketplace.

- (e) **Key Personnel and Bibliography of Related Work.** Identify key personnel involved in Phase 1, including their related education, experience, and publications. Where resumes are extensive, summaries that focus on the most relevant experience and publications are suggested. List all other commitments that key personnel have during the proposed period of contract performance.
- (f) **Relationship with Future R&D.** Discuss the significance of the Phase 1 effort in providing a foundation for the Phase 2 R&D effort. Also state the anticipated results of the proposed approach, if Phases 1 and 2 of the project are successful.
- (g) **Facilities and Equipment.** The conduct of advanced research may require the use of sophisticated instrumentation or computer facilities. The proposer should provide a detailed description of the availability and location of the facilities and equipment necessary to carry out Phase 1.
- (h) **Consultants and Subcontracts.** The purpose of this section is to convince NOAA that: (1) research assistance from outside the firm materially benefits the proposed effort, and (2) arrangements for such assistance are in place at the time the proposal is submitted.

Outside involvement in the project is encouraged where it strengthens the conduct of the research; such involvement is not a requirement of this solicitation.

- 1. Consultant A person outside the firm, named in the proposal as contributing to the research, must provide a signed statement confirming his/her availability, role in the project, and agreed consulting rate for participation in the project. *This statement is part of the page count.*
- 2. Subcontract Similarly, where a subcontract is involved in the research, the subcontracting institution must furnish a letter signed by an appropriate official describing the programmatic arrangements and confirming its agreed participation in the research, with its proposed budget for this participation. *This letter is part of the page count.*

- (i) Potential Commercial Application and Follow-on Funding Commitment. Describe in detail the commercial potential of the proposed research, how commercialization would be pursued, benefits over present products on the market, and potential use by the Federal Government.
- (j) Cooperative Research and Development Agreements (CRADA). State if the applicant is a current CRADA partner with NOAA, or with any other Federal agency, naming the agency, title of the CRADA, and any relationship with the proposed work.
- (k) **Guest Researcher.** State if the applicant is a guest researcher at NOAA, naming the sponsoring laboratory.
- (I) **Cost Sharing.** Cost participation could serve the mutual interest of NOAA and certain SBIR contractors by helping to assure the efficient use of available resources. Except where required by other statutes, NOAA does not encourage or require cost sharing on Phase 1 projects, nor will cost sharing be a consideration in evaluation of Phase 1 proposals.

3.4 Equivalent Proposals or Awards

A firm may have received other SBIR awards or elected to submit essentially equivalent proposals under other SBIR program solicitations. In these cases, a statement **must** follow the Technical Content section in the proposal indicating:

- (a) the name and address of all agencies to which a proposal was submitted or from which an SBIR award was received:
- (b) the date of proposal submission or date of award;
- (c) the title, number, and date of the SBIR program solicitation under which a proposal was submitted or award received;
- (d) the specific applicable research topic for each proposal submitted or award received;
- (e) the title of the research project; and
- (f) the name and title of the principal investigator for each proposal submitted or award received.

If no equivalent proposal is under consideration or equivalent award received, a statement to that effect **must** be included in this section.

3.5 Prior SBIR Phase 2 Awards

If a small business concern has received one or more Phase 2 awards from any of the Federal agencies in the prior 5 fiscal years, it must submit on a separate page, the names of awarding agencies, dates of awards, funding agreements numbers, amounts, topics or subtopic titles, follow-on agreements amounts, sources and dates of commitments, and current commercialization status for each Phase 2. This required information shall not be part of the page count limitation.

3.6 Proposed Budget

Complete the "SBIR Proposal Summary Budget" (Section 9) for the Phase 1 effort, and include it as the last page of the proposal. Some items of this form may not apply. Enough information should be provided to allow NOAA to understand how the offeror plans to use the requested funds if the contract is awarded. A complete cost breakdown should be provided giving labor rates, proposed number of hours, overhead, G&A, and profit. A reasonable profit will be allowed. When proposing travel, identify the number of trips, people involved, labor categories, destination of travel, duration of trip, commercial air fare or mileage rate, per diem expenses, and purpose of travel. Budgets for travel funds must be justified and related to the needs of the project.

Where equipment is to be purchased, list each individual item with the corresponding cost. The inclusion of equipment will be carefully reviewed relative to need and appropriateness for the research proposed. Equipment is defined as an article of nonexpendable, tangible property having a useful life of more than 1 year and an acquisition cost of \$5,000 or more per unit.

Title to equipment will be vested with NOAA, unless it is determined that transfer of title to the contractor would be more cost effective than recovery of the equipment. Equipment purchased with NOAA funds will be inventoried by NOAA.

SBA Policy requires that NOAA not issue SBIR awards that include provisions for subcontracting any portion of the contract back to the originating agency or any other Federal agency unless such subcontracting is vital to its mission and equivalent resources are not available in the private sector. For Phase 1, a minimum of two-thirds of the research and/or analytical effort must be performed by the proposing firm. The total cost for all consultant fees, facility leases, usage fees, and other subcontract or purchase agreements may not exceed one-third of the total contract. For Phase 2, one-half of the research and/or analytical effort must be performed by the proposing firm. Deviation from these requirements must be approved by the program manager in consultation with the contracting officer.

4.0 METHOD OF SELECTION AND EVALUATION CRITERIA

4.1 Introduction

All Phase 1 and 2 proposals will be evaluated on a competitive basis. Each Phase 1 proposal will be screened by NOAA to ensure that it meets the administrative requirements outlined in Section 4.2. Proposals that meet these requirements will be peer reviewed, undergo competition within each laboratory, and may also undergo a third round of competition across the agency.

4.2 Phase 1 Screening Criteria

To avoid a misunderstanding, small businesses are cautioned that Phase 1 proposals not satisfying all the screening criteria shall be returned without peer review and eliminated from consideration for a contract. Proposals may not be resubmitted (with or without revision) under this solicitation. All copies of proposals that fail the screening process will be returned. The screening criteria are:

- (a) The proposing firm must qualify as a small business (Section 2.1). If it is a subsidiary of another firm, this limit applies to all employees under control of the parent organization.
- (b) The Phase 1 proposal must meet **all** of the requirements stated in Section 3.
- (c) The Phase 1 proposal must be limited to one subtopic and clearly address research for that subtopic.
- (d) Phase 1 proposal budgets must not exceed \$75,000 (except subtopics with the suffix "SG", which are limited to \$50,000), including subcontract, indirect cost, and fee.
- (e) The project duration for the Phase 1 research must not exceed 6 months.
- (f) A minimum of two-thirds of expenditures under each Phase 1 project must be carried out by the proposing firm.
- (g) The proposal must contain information sufficient to be peer reviewed as research.

4.3 Phase 1 Evaluation and Selection Criteria

Phase 1 proposals will be rated by NOAA and/or external scientists or engineers with equal consideration given to the following criteria, except for item (a), which will receive

twice the value of any of the other items:

- (a) The scientific and technical merit of the Phase 1 research plan and its relevance to the objectives, with special emphasis on its innovativeness and originality.
- (b) Importance of the problem or opportunity and anticipated benefits of the proposed research to NOAA, and the commercial potential, if successful.
- (c) How well the research objectives, if achieved, establish the feasibility of the proposed concept and justify a Phase 2 effort.
- (d) Qualifications of the principal investigator(s), other key staff, and consultants, and the probable adequacy of available or obtainable instrumentation and facilities.

Technical reviewers will base their ratings on information contained in the proposal. It cannot be assumed that reviewers are acquainted with any experiments referred to, key individuals, or the firm.

Final award decisions will be made by NOAA based upon ratings assigned by reviewers and consideration of additional factors, **including possible duplication of other research**, the importance of the proposed research as it relates to NOAA needs, and the availability of funding. NOAA may elect to fund several or none of the proposals received on a given subtopic. Upon selection of a proposal for a Phase 1 award, NOAA reserves the right to negotiate the amount of the award.

4.4 Phase 2 Evaluation and Selection Criteria

The Phase 2 proposal will undergo NOAA and external peer review for the purpose of determining overall technical or scientific merit. Review panels (one for subtopics identified as "SG", and one for all other subtopics), composed of senior technical specialists, will make the final Phase 2 selection decision based on the written reviews and the company presentation to the panel. Each of the following evaluation criteria will receive approximately equal weight, except for item (a), which will receive twice the value of any of the other items:

- (a) The scientific and technical merit with emphasis on innovation and originality.
- (b) Degree to which the Phase 1 objectives were met.
- (c) The commercial potential of the proposal as evidenced by: a) a record of commercialization, b) the existence of Phase 2 funding commitments from non-SBIR sources, c) existence of Phase 3 follow-on commitments, and d)

the presence of other indications of commercial potential of the research.

- (d) The adequacy of the Phase 2 objectives to meet the problem or opportunity.
- (e) The qualifications of the principal investigator and other key personnel to carry out the proposed work.

Upon selection of a proposal for Phase 2 award, NOAA reserves the right to negotiate the amount of the award. NOAA is not obligated to fund any specific Phase 2 proposal.

4.5 Release of Proposal Review Information

After final award decisions have been announced, the technical evaluations of a proposal will be provided to the proposer only upon written request and for a period not to exceed 90 days. The identity of the reviewers will not be disclosed.

5.0 CONSIDERATIONS

5.1 Awards

Contingent upon availability of funds, NOAA anticipates making about **10** Phase 1 firm-fixed-price contracts of no more than **\$75,000** each (except for subtopics with the suffix "SG", which are limited to \$50,000). Performance period shall be no more than 6 months beginning on the contract start date. Historically, NOAA has funded five to ten percent of the Phase 1 proposals submitted.

Phase 2 awards shall be for no more than \$300,000 (except for subtopics with the suffix "SG", which are limited to \$200,000). The period of performance in Phase 2 will depend upon the scope of the research, but should not normally exceed 24 months.

It is anticipated that approximately one-third of the Phase 1 awardees will receive Phase 2 awards, depending upon the availability of funds. To provide for an in-depth review of the Phase 1 final report and the Phase 2 proposal and commercialization plan, Phase 2 awards will be made approximately 7 months after the completion of Phase 1.

For planning purposes, proposers should understand that Phase 1 awards are made in July, Phase 2 proposals are due the following February, and Phase 2 awards are made during August and September.

This solicitation does not obligate NOAA to make any awards under either Phase 1 or Phase 2. Furthermore, NOAA is not responsible for any monies expended by the proposer before award of any contract resulting from this solicitation.

5.2 Reports

Six copies of a final report on the Phase 1 project shall be submitted to NOAA upon completion of the Phase 1 research. The final report shall include a single-page project summary as the first page, identifying the purpose of the research, and giving a brief description of the research carried out, the research findings or results, and the commercial applications of the research in a final paragraph. The remainder of the report should indicate in detail the research objectives, research work carried out, results obtained, and estimates of technical feasibility.

All final reports must carry an acknowledgment on the cover page such as: "This material is based upon work supported by the Department of Commerce under contract number. Any opinions, findings, conclusions or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the views of the Department of Commerce."

Progress reports in a brief letter format will be required also.

5.3 Payment Schedule

The specific payment schedule (including payment amounts) for each contract will be incorporated into the contract upon completion of negotiations between the Government and the successful Phase 1 or Phase 2 contractor. Progress payments are normally scheduled.

5.4 Proprietary Information, Inventions, and Patents

5.4.1 Limited Rights Information and Data

Information contained in unsuccessful proposals will remain the property of the proposer. The Government may, however, retain copies of all proposals. Any proposal which is funded will not be made available to the public, except for the "Project Summary" page.

The inclusion of proprietary information is discouraged unless it is absolutely necessary for the proper evaluation of the proposal.

Proprietary information submitted to NOAA will be treated in confidence, to the extent permitted by law, if it is confined to a separate page with a numbering system key, and marked with a legend reading:

"Following is proprietary information which (name of proposing firm) requests not be released to persons outside the Government, except for purposes of evaluation."

Any other legend will be unacceptable to NOAA and may constitute grounds for return of the proposal without further consideration. Without assuming any liability for inadvertent disclosure, NOAA will limit dissemination of such information to its employees and, where necessary for evaluation, to outside reviewers on a confidential basis.

Since technical reports may eventually be made available to the public, such reports shall not contain any language limiting their use other than for SBIR data as described below.

5.4.2 Copyrights

The contractor may normally establish claim to copyright any written material first produced in the performance of an SBIR contract. If a claim to copyright is made, the contractor shall affix the applicable copyright notice of 17 U.S.C. 401 or 402 and acknowledgment of Government sponsorship (including contract number) to the material when delivered to the Government, as well as when the written material or data are published or deposited for registration as a published work in the U.S. Copyright Office. For other than computer software, the contractor gives to the Government, and others acting on its behalf, a paid-up, nonexclusive, irrevocable, worldwide license to reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, by or on behalf of the Government.

For computer software, the contractor gives to the Government, and others acting on its behalf, a paid-up, nonexclusive, irrevocable, worldwide license for all such computer software to reproduce, prepare derivative works, and perform publicly and display publicly, by or on behalf of the Government.

5.4.3 Data Rights

Except for copyrighted data, the Government shall normally have unlimited rights to data in Phase 1, 2, or 3 awards, such as:

- (a) data specifically identified in the SBIR contract to be delivered without restriction;
- (b) form, fit, and function data delivered under the contract;
- (c) data delivered under the contract that constitute manuals or instructions and training material for installation, operation, or routine maintenance and repair of items, components, or processes delivered or furnished for use under the contract; and
- (d) all other data delivered under the contract unless identified as SBIR data.

According to Federal Acquisition Regulation 52.227-20, Rights and Data - SBIR Program (March 1994), the contractor is authorized to affix the following "SBIR Rights Notice" to SBIR data delivered under the contract:

SBIR RIGHTS NOTICE

These SBIR data are furnished	ed with SBIR	ights under Contrac	t
No (and subc	ontract	, if ap	propriate). For a
period of 4 years after accept	ance of all ite	ms to be delivered ເ	inder this contract,
the Government agrees to us	e these data	for Government purp	oses only, and
they shall not be disclosed or	utside the Gov	ernment (including o	disclosure for
procurement purposes) durin	g such period	without permission	of the contractor,
except that, subject to the for	going use an	d use by support con	tractors. After the
aforesaid 4-year period, the C	Sovernment h	as a royalty-free lice	nse to use, and to
authorize others to use on its	behalf, these	data for Governmer	nt purposes, but is
relieved of all disclosure proh	nibitions and a	ssumes no liability for	or unauthorize
(END OF NOTICE)			

The Government's sole obligation with respect to any properly identified SBIR data shall be as set forth in the paragraph above. The 4-year period of protection applies for Phases 1, 2, and 3.

5.4.4 Patents

Small business firms normally may retain the worldwide patent rights to any invention made with NOAA support. NOAA receives a royalty-free license for Federal Government use, reserves the right to require the patent holder to license others in certain circumstances, and requires that anyone exclusively licensed to sell the invention in the United States must manufacture it domestically. To the extent authorized by 35U.S.C.205, NOAA will not make public any information disclosing a NOAA-supported invention for a 4 - year period to allow the contractor a reasonable time to pursue a patent. SBIR awardees must report inventions to NOAA within 2 months of the inventor's notice to the awardee.

5.5 Awardee Commitments

Upon the award of a contract, the contractor will be required to make certain legal commitments. The outline that follows illustrates the types of provisions that will be included in the Phase 1 contract.

- (a) Standards of Work. Work performed under the contract must conform to high professional standards.
- (b) Inspection of Work. Work performed under the contract is subject to Government inspection and evaluation at all reasonable times.

- (c) Examination of Records. The Comptroller General (or a duly authorized representative) shall have the right to examine pertinent records of the contractor involving transactions related to this contract.
- (d) Default. The Government may terminate the agreement if the contractor fails to perform the work contracted.
- (e) Termination for Convenience. The contract may be terminated at any time by the Government if it deems termination to be in the best interest, in which case the contractor will be compensated for work performed and for reasonable termination costs.
- (f) Disputes. Any dispute concerning the contract, which cannot be resolved by agreement, shall be decided by the Contracting Officer with right to appeal.
- (g) Contract Work Hours. The contractor cannot require an employee to work more than 8 hours a day or 40 hours a week, unless the employee is compensated accordingly (i.e., receives overtime pay).
- (h) Equal Opportunity. The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin.
- (i) Affirmative Action for Veterans. The contractor will not discriminate against any employee or applicant for employment because he or she is a disabled veteran or veteran of the Vietnam era.
- (j) Affirmative Action for the Handicapped. The contractor will not discriminate against any employee or applicant for employment because he or she is physically or mentally handicapped.
- (k) Officials Not to Benefit. No Government official shall benefit personally from any SBIR contract.
- (I) Covenant Against Contingent Fees. No person or agency has been employed to solicit or secure the contract upon an understanding for compensation, except bona fide employees or commercial agencies maintained by the contractor for the purpose of securing business.
- (m) Gratuities. The contract may be terminated by the Government if any gratuity has been offered to any representative of the Government to secure the contract.
- (n) Patent Infringement. The contractor shall report each notice or claim of

- patent infringement based on the performance of the contract.
- (o) American-Made Equipment and Products. When purchasing either equipment or a product with funds provided through the contract, purchase only American-made equipment and products, to the extent possible in keeping with the overall research needs of the project.

5.6 Additional Information

- (a) Projects--The responsibility for the performance of the principal investigator, and other employees or consultants who carry out the proposed work, lies with the management of the organization receiving an award.
- (b) Organizational Information--Before award of an SBIR contract, the Government may request the proposer to submit certain organizational, management, personnel, and financial information to assure responsibility of the proposer.
- (c) Duplicate Awards--If an award is made under this solicitation, the contractor will be required to certify that he or she has not previously been, nor is currently being, paid for essentially equivalent work by any agency of the Federal Government. Severe penalties may result from such actions.

This program solicitation is intended for informational purposes and reflects current planning. If there is any inconsistency between the information contained herein and the terms of any resulting SBIR contract, the terms of the contract are controlling.

5.7 Research Projects with Human Subjects, Human Tissue, Data or Recordings Involving Human Subjects

Any proposal that includes research involving human subjects, human tissue, data or recordings involving human subjects must meet the requirements of the Common Rule for the Protection of Human Subjects, codified for the Department of Commerce at 15 CFR Part 27. Any questions regarding these requirements should be addressed to Dr. Joseph M. Bishop (301) 713-3565 or joseph.bishop@noaa.gov.

5.8 Research Projects Involving Vertebrate Animals

Any proposal that includes research involving vertebrate animals (including fish) must be in compliance with the National Research Council's "Guide for the Care and Use of Laboratory Animals" which can be obtained from National Academy Press, 2101 Constitution Avenue, NW, Washington, D.C. 20055. In addition, such proposals must meet the requirements of the Animal Welfare Act (7 U.S.C. 2131 et seq.), 9 CFR Parts

1, 2, and 3, and if appropriate, 21 CFR Part 58. These regulations do not apply to proposed research using pre-existing images of animals or to research plans that **do not** include live animals that are being cared for, euthanized, or used by the project participants to accomplish research goals, teaching, or testing. These regulations also do not apply to obtaining animal materials from commercial processors of animal products or to animal cell lines or tissues from tissue banks.

6.0 SUBMISSION OF PROPOSALS

6.1 Deadline for Proposals

Deadline for Phase 1 proposal receipt (6 copies) at the Contract Administration Branch is noon (EST) on January 16, 2002.

NOAA assumes no responsibility for evaluating proposals received after the stated deadline or that do not adhere to the other requirements of this solicitation (see checklist at back of booklet). Such proposals may be returned to the proposer without review.

Federal Acquisition Regulation (FAR 52 215-1) regarding late proposals shall apply. Letters of instruction will be sent to those eligible to submit Phase 2 proposals. The Phase 2 proposals are due at about the same time as Phase 1 final reports - 7 months after commencement of the Phase 1 contract.

Proposers are cautioned to be careful of unforeseen delays which can cause late arrival of proposals at NOAA, resulting in them not being included in the evaluation procedures. No information on the status of proposals under scientific/technical evaluation will be available until formal notification is made.

6.2 Proposal Submission

Hardcopy submission of NOAA proposals should be sent in 6 copies to:

ATTN: SBIR Proposals U.S. Department of Commerce, NOAA Contract Administration Branch, Code OFA613 1305 East-West Highway, SSMC4, Station 7604 Silver Spring, MD 20910-3281 Telephone: (301) 713-0829

For local delivery, the Contract Administration Branch is located near the intersection of East-West Highway and Colesville Road, and close to the Silver Spring Metro stop.

Acknowledgment of receipt of a proposal by NOAA will be made. All correspondence

relating to proposals must cite the specific **proposal number** identified on the acknowledgment.

- (a) Packaging--Secure packaging is mandatory. NOAA cannot process proposals damaged in transit. All 6 copies of the proposal must be sent in the same package. Do not send separate "information copies," or several packages containing parts of a single proposal, or two packages of 6 copies of the same proposal. The top copy must be signed as an original by the principal investigator and the corporate official. Other copies may be photocopies.
- (b) Bindings--<u>**Do not use special bindings or covers.**</u> Staple the pages in the upper left hand corner of each proposal. Separation or loss of proposal pages cannot be the responsibility of NOAA.

6.3 Warning

While it is permissible, with proper notification to NOAA, to submit identical or essentially equivalent proposals for consideration under numerous Federal program solicitations, it is unlawful to enter into contracts requiring essentially equivalent effort. If there is any question concerning this, it must be disclosed to the soliciting agency or agencies before award.

7.0 SCIENTIFIC AND TECHNICAL INFORMATION SOURCES

7.1 General Information

The following organization may be a source for providing technology search and/or document services and may be contacted directly:

NOAA Library 1315 East-West Highway Second Floor, SSMC3 Silver Spring, MD 20910 (301) 713-2600

7.2 Oceanography and Marine Science

Scientific information in the areas of oceanography and marine science may be obtained from the following organizations:

University of Alaska P.O. Box755040 Fairbanks, AK 99775 907/474-7086

University of California-San Diego 9500 Gilm an Drive LaJolla, CA 92093 619/534-4440

Hancock Institute for Marine Studies University Park Los Angeles, CA 90089 213/740-1961

University of Connecticut 108 4 Shennec oss ett Road Groton, CT 06340 203/445-3457

University of D elaware Robinson Hall, Rm 111 Newark, DE 19716 302/831-2841

University of Florida Building 803 Gainesville, FL 32611 904/392-5870

University of Georgia Eco logy B uilding Athens, GA 30602 706/542-6009

University of Hawaii 1000 Pope Road, Rm. 223 Honolulu, HI 96822 808/956-7031

University of Illinois 65 Mumford Hall 1301 W. Gregory Drive Urbana, IL 61801 217/333-9448

Purdue University 1159 Fo restry B uilding W. Lafayette, N 47907 317/494-3573

Loui sia na State Univers ity 128 Wetland Resources Baton Rouge, LA 70803 504/388-6710 University of Mai ne 14 Co burn Hall Orono, ME 04469- 0114 207/581-1436

University of Maryland 0112 Skinner Hall College Park, MD 20742 301/405-6371

Massachusetts Institute of Technology Bldg. E38, Room 330 77 Massachusetts A venue Cambridge, MA 02139 617/253-7131

Woods Hole Oce anog raphi c Inst. CRL 209 Woods Hole, MA 02543 508/457-2000 ext 2665

University of Michigan 410 7 I.S.T. Building 2200 Bonisteel Blvd. Ann Arbor, MI 48109 313/763-1437

University of Minne sota 2305 East 5th Street Duluth, MN 55812 218/726-8106

MS-AL Sea Grant Consortium P.O. Box7000 703 East Beach Drive Ocean Springs, MS 39564 601/875-9341

University of New Hamp shire Ocean Process Analysis Lab. 142 Morse Hall Durham, NH 03824 603/862-3505

NJ Marine Sciences Consortium Building No.22 Ft. Hancock, NJ 07732 908/872-1300

State University of New York 115 Nassa u Hall Stony Brook, NY 11794 516/632-6905 North Carolina State University Box 8605 Raleigh, NC 27695 919/515-1454

Ohio State University 1541 Research Center 1314 Kinnear Road Columbus, OH43212 614/292-8949

Oreg on State University Administrative Services Corvalis, OR 97331 503/737-3396

University of Puerto Rico Dept. of Marine Science P.O. Box5000 Mayaguez, PR 00681 809/832-3585

University of Rhode Island Marine Resources Bldg. Narra gans ett Bay Camp us Narragansett, RI 02882 401/792-6800

South Carolina Sea Grant Consortium 287 Meeting Street Charleston, SC 29401 803/727-2078

Texas A&M University 1716 Briarcrest Drive Suite 702 Bryan, TX 77802 409/845-3854

Virginia Graduate Marine Science Consortium Madison House 170 Rugby Road Charlottesville, VA 22903 804/924-5965

University of Washington HG-30 3716 Brook lyn Ave, N.E. Seattle, WA 98105- 6716 206/543-6600

University of WI-Madison 180 0 University Avenue Madison, WI 53705 608/262-0905

8.0 RESEARCH TOPICS

8.1 TOPIC: ATMOSPHERIC SCIENCES

8.1.1R Subtopic: Advances in Ammonia Detection Systems for Improved Measurements of Dry Deposition

In many east coast estuaries, human-induced sources of nitrogen far exceed natural inputs, primarily from industrial, automotive, and agricultural activities. During the last decade, confined animal feeding operations have greatly exacerbated nitrogen loadings from reduced nitrogen compound, and many state and federal institutions are scrambling to understand the resulting impacts on sensitive coastal ecosystems. These problems are presently manifested in major coordinated studies in the Chesapeake Bay, Tampa Bay, and Cape Fear River watersheds, and will be the focus of many additional jurisdictions facing compliance with Clean Water Act regulations requiring assessment of nitrogen loadings from all relevant sources, including the atmosphere.

All attempts to manage nitrogen loadings will require an adequate measurement data base. At present, there are no studies that have adequately quantified the atmospheric deposition of reduced nitrogen because of limitations in the measurement technology. Collection devices such as filterpacks or annular denuders have been used to evaluate long term airborne concentrations of nitrogen containing compounds. These methods are labor intensive, requiring manual preparation, installation, and chemical extraction and analysis for each filterpack or denuder exposed. Continuous monitoring systems that are both low power (for more remote operation) and sensitive at ambient levels of ammonia are desired. These new systems should be able to be coupled with micrometeorological methods in order that the deposition of these constituents to bays and watersheds can be quantified. This is key to understanding regional nitrogen budgets and quantifying how much and in what form nitrogen is being deposited to sensitive ecosystems.

The new measurement system must be capable of providing data at 1 second intervals. The sampling system could either consist of an "open path" sampling volume or a closed cell system in which the air sample is brought to the sample chamber. Calibrations of the instrument should have to be repeated no more than once per week. The system must be capable of operation under a wide array of ambient conditions including high wind and warm temperatures. The sampler shall be powered by 110 V AC line power or by 12 V DC battery. NOAA requests proposals for a robust measurement system for ammonia that provides a minimum detection limit of 1 ppb, has a time response of no more than 1 second, and is portable enough to be used with micrometeorolgical instrumentation for deposition studies. An examination of other systems used throughout the world has not identified another sampler meeting this requirement. The successful applicant will demonstrate a successful design at the end of Phase I. It is expected that the final product will be marketable at a cost between \$10,000 and \$25,000.

8.1.2R Subtopic: Low-cost Automated Aerosol Lidar for Air Quality Assessment and Prediction

The value of lidar has been demonstrated numerous times for air quality observations by measuring aerosol profiles in the boundary layer. Determination of the mixed layer depth from gradients or variability of the aerosol signal is a prime application. The Environmental Technology Laboratory seeks development of a small, eyesafe, and robust lidar that can achieve this function in an operational mode. Low cost (< \$50K or so each for a market totaling >20 units per year) is an important requirement. Such a lidar would fill an emerging need for measurements at numerous locations in metropolitan areas to improve air quality prediction and even to guide short-term decisions by local authorities for mitigation of emissions and issuance of air quality alerts.

At least two existing kinds of systems approach the desired specifications, but are not yet adequate. One is a lidar ceilometer of the type used by the National Weather Service for cloud base height measurements. Unfortunately, this type of lidar so far has not had sufficient sensitivity in aerosol detection. Another approach is the "micropulse lidar" concept, which has uses an expanded transmit beam to achieve eye safety, but this type of system is still too expensive and insufficiently robust. New technological approaches or major improvements in existing types of lidar are possible under this opportunity.

Guidelines for the specifications are as follows. An ultraviolet, visible, or infrared wavelength is permitted as long as other specifications are met, but an invisible beam is preferred. Any emission into the atmosphere must meet all guidelines from federal agencies for eye safety. Height resolution should be 15 m or better, and temporal resolution (averaging of pulses permitted) should be 1 minute or better. The system will preferably be free of strong signal artifacts so profiling of backscatter can be dependable. The system should be powered by 110V AC at 60 Hz. Scheduled technical maintenance is permitted at a frequency of no more than once per month, but the procedures should be simple and require no more than 30 minutes. The expected schedule for maintenance should be specified for a 5-year operating lifetime.

The sensitivity and signal-to-noise ratio must be good enough to allow detection of small vertical gradients in aerosol backscatter up to 4 km height, but maximum height should be 12 km or better to allow cloud detection and perhaps calibration from a clean layer of the atmosphere. The lower the better for the minimum height for useful measurements, but should not be greater than 200 m. Because the sensitivity requirements are difficult to define without first specifying the wavelength, the proposal should include brief calculations indicating how subtle such gradients can become and still be detected by the lidar. Two examples are requested, both in the daytime: one in highly polluted conditions and the other in relatively clean air.

The design should include transceiver, automated control, and automated data handling, storage, and transmission via internet. Development of automated interpretive algorithms

is optional in this project, but the computer hardware and software should have the capacity for the user later to add such algorithms of modest sophistication. The system should be able to operate from a compact, all-weather housing, but design of that feature in this project is also optional.

8.1.3GP Subtopic: Automated Sonde Launching System

The NOAA Office of Global Programs has broad interest in the measurement of atmospheric variables using vertical profiling technology, e.g., the measurement of atmospheric temperature, humidity, and winds with balloon-borne radiosondes. To address expanding requirements in this area, proposals are requested for an automated sonde-launching system adaptable to use on shipboard and land-based platforms. The proposed solution should include the handling of the lifting gas, integration of sensor instrumentation, launch of the instrumentation package, and interfacing with existing data recording/transmitting technology. To accommodate a variety of field applications, the system also needs to combine mobility with ease of installation, operations and maintenance.

8.1.4W Subtopic: Wireless Environmental Sensor Communications Interface

The National Data Buoy Center (NDBC) operates a network of moored buoys and fixed coastal marine stations, as well as the Volunteer Observing Ship (VOS) Program, that measure a variety of meteorological and oceanographic variables for the National Weather Service for use in weather forecasting and climate prediction. In the VOS Program, NDBC installs meteorological and oceanographic sensor measurement packages on privately owned and commercial vessels which provide these data to NOAA from disparate geographical areas. Measurements are typically made by sensors interfaced to a Data Collection Platform (DCP) by electrical cables. The cables transmit analog voltages, digital signals, or digital serial communications to the DCP. The DCP digitizes the analog voltages or records digital measurements and may average them over a programmed time period. The measurements are then transmitted to NDBC via the Geostationary Operating Environmental Satellite (GOES) at synoptic intervals from buoys and fixed stations and via commercial satellite from the VOS.

The interconnecting cables to the sensors are often a point of failure in the measurement system as a result of environmental degradation, biological damage, vandalism, or accidental damage. In addition, the cables can be a source of measurement errors due to electrical noise as a result of the lengths of cables required for some sensors. Some sensors must be located external to the buoy or station enclosure in order to make a valid measurement and require cables that are often subjected to harsh environmental conditions. Electrical cables are typically replaced when a station is refurbished and represents a recurring station and buoy operating expense. In addition, the necessity to locate some sensors external to a buoy or station enclosure require buoy or ship hull penetrations or station enclosure penetrations for cable routing, a potential source of moisture intrusion which can damage electronics and batteries. Long cable runs and hull

penetrations on ships are also very expensive to install and maintain.

The development of a low-power consumption, low-cost, standardized wireless communications interface between sensor and DCP could eliminate some cables used on NDBC buoy and fixed stations and volunteer ships that are exposed to these environmental influences. Such a wireless communications standard could, in some instances, be line-of-sight, however NDBC has several potential applications that would of necessity require non-line-of-sight communications. In addition to having non-line-ofsight capability, a wireless communications standard for NDBC applications would require an effective range of between 200 and 300 meters and be capable of communication in enclosed spaces and through buoy or ship hulls or station enclosures constructed of aluminum or steel. The wireless communications standard might consist of a transmitter/receiver module that is embedded in a microprocessor-controlled sensor with a similar module embedded in the DCP or as a separate module that could be interfaced to sensors and DCPs with RS-232 or some other standard input/output. A number of transmitter/receiver modules embedded in multiple sensors would ideally be individually addressable by a single transmitter/receiver module on the DCP using a standardized protocol.

There are several technologies available that could potentially be used to develop a wireless communications module and standard. Some of the technologies available for non-line-of-sight wireless communications include the radio frequency Bluetooth standard used in cellular phone communications; low cost, low power, miniature UHF communications modules such as the XEMICS USA, Inc.; or the radio frequency technology used in electric garage door openers. Some available technologies for line-of-sight wireless communications include the infrared (IRDA) standard used in personal computer peripheral devices and the infrared transmitters and receivers used in remote control devices such as televisions and video cassette recorders.

Reference:

National Data Buoy Center web site, <u>www.ndbc.noaa.gov</u>, for background information on NDBC and its programs.

8.1.5W Subtopic: Alternative Power Sources for Data Buoys

The buoys that the National Data Buoy Center (National Weather Service) deploys at sea and on the Great Lakes use autonomous electrical power supplies. These power sources provide electrical energy, on a continuous basis, to the several sensors and data-collection/communication systems carried on board. In the past electrical power has been supplied first by diesel/electrical generators, later by large banks of primary (non rechargeable) batteries, and at present by photovoltaic systems that use solar panels and secondary (rechargeable) batteries. The diesel and non-rechargeable battery designs were expensive but able to power the buoys without interruption for approximately three years. The photovoltaic/secondary battery systems can operate a

typical complement of NDBC buoy electronics and sensors for a longer time. A four- to five-year reliable operating life is being obtained with use of the current design.

The success NDBC has had in providing reliable, quality data from buoys has increased the desire to add new measurement capability to those platforms. Current power systems are already stressed, particularly in northern latitudes, to provide the energy needed to collect, analyze, and transmit the needed data. Many of the sensors being considered for installation on buoys have considerable power demands. The innovative research now being sought by NDBC must address the pressing need for an electrical power supply that will operate reliably, continuously, and unattended for long periods of time and produce all the electrical energy required for the total operation of a data buoy while it is deployed. The innovative power system design can be based on the types that have already been used at NDBC, but other electrical power-generation techniques can be chosen. It is important, however, that the proposed design be installable on the buoys presently used by NDBC without interference to other existing on-board equipment. It is expected that the electrical power supply design developed in particular for NDBC buoy applications will be readily adaptable to other commercial needs that require--for their stand-alone electrical power source--small size, portability, excellent full-capacity duration, unattended long-term reliability, and low initial/operating cost.

Reference:

National Data Buoy Center web site, <u>www.ndbc.noaa.gov</u>, for background information NDBC, its buoys, and its programs.

8.2 TOPIC: OCEAN OBSERVATION SYSTEMS

8.2.10 Subtopic: Operational Ocean Instrumentation, Measurements, and Data/Information dissemination Systems

Development of operational ocean instrumentation, measurement, and data/information dissemination systems is sought to support a wide range of NOAA's National Ocean Service (NOS) operational activities, such as the Physical Oceanographic Real-Time System (PORTS) Program, the National Water Level Observation Network (NWLON) Program, coastal and estuarine forecast systems, and environmental monitoring associated with sustaining healthy coasts and mitigation of coastal hazards. Development generally includes sensing, data acquisition, processing and analysis, and information dissemination. One area of emphasis is systems that can be operated in an unattended mode. These systems should provide near real-time data acquisition and dissemination. Another area of emphasis is remote sensing systems which allow rapid acquisition of data from large coastal areas. High reliability, known accuracy, and cost effectiveness are important design considerations. The parameters of interest are comprehensive, including (1) physical, chemical, and biological properties of the coastal ocean environment; (2) pollutants; and (3) overlying atmospheric parameters. These systems provide marine environmental information in support of safe navigation, safe

transportation of hazardous materials, economic benefits to marine commerce, management of marine resources, assessment of coastal ecosystems health, and mitigation of natural hazards. Of particular interest this year are proposals relative to the following:

- a.) Long-Term and Real-Time Water Quality Monitoring System -- Water quality in estuarine waters such as bays and harbors is important to coastal commerce, recreation, and ecological health. An efficient and reliable in-situ system with known accuracy that can measure key water quality parameter(s) such as dissolved oxygen, nutrients, and/or chlorophyll is sought. Existing instruments do not meet the criteria of long-term, unattended, and real-time operational capabilities. Unattended long service interval (3-month or longer) and real-time reporting are required. Solutions to technical problems associated with long-term calibration stability (such as internal chemical process, marine fouling and corrosion) should be addressed. The technology is a candidate for integration with the existing National Ocean Service's PORTS or NWLON monitoring systems (see http://www.co-ops.nos.noaa.gov). System output should be compatible with standard interfaces to commercial data communication devices such as RS-232 ports, telephone, wireless phone, line-of-sight radio, or over the Internet.
- b.) High Resolution Surface Current Mapping in Harbors -- The National Ocean Service has installed PORTS in many harbors to promote safe and efficient marine transportation. A primary requirement of the maritime community for these systems is the observation of water currents at selected locations. CO-OPS uses upward-looking Acoustic Doppler Current Profilers (ADCP) mounted on the bottom and cabled to shore. While this configuration provides a good current profile throughout the water column, it is a single-point observation that is relatively costly and difficult to maintain. In confined waterways with winding channels, the maritime community requires many more ADCPs than can be reasonably procured or maintained. For example, pilots identified fourteen locations in the Hampton Roads portion of the southern Chesapeake Bay alone. Remote sensing in the form of radar surface current mapping systems is an approach more suited to the spatial coverage required, but existing systems cover too wide an area with resolution too coarse for harbors and waterways. Existing shore-based High Frequency (HF) Doppler radar surface current mapping instruments cover up to 50 thousand square kilometers with a grid spacing of 6 x 6 kilometers, or as small as 150 square kilometers with a grid spacing of as little as 100 x 100 meters (See Http://www.codaros.com/products/HiResSpecs.htm). CO-OPS seeks a robust sensing system to observe water currents on space and time scales suited to harbors, (i.e., order of 10 x 10 meter grid spacing, near real-time reporting at hourly or shorter time intervals), with errors less than 10 cm/sec. The ideal system must operate in both fresh and salt water, and under most conditions experienced in the harbor/bay environment. Preference is given to shore-based observations for ease of maintenance and access to data. Another critical feature is that the system should be modestly priced in order to sustain a healthy commercial market.
 - c.) Digital Camera Visibility Sensor -- A digital camera visibility sensor similar to

that of human observation is sought. Typical visibility sensors determine the scattering properties within a relatively small air volume, and then use a transfer algorithm to convert that observation into a distance measurement equivalent to that which a human observer would report. While achieving an objective measurement, differences exist between the two observation techniques. A good, but also a brief description of the limitations of automated visibility sensors as compared to human observations can be found at http://www.nws.noaa.gov/asos/vsby.htm. Visual images are now routine for automobile traffic reports and vessel traffic management. The images are satisfactory for subjective determination of visibility, but this solicitation seeks a method to quantify the observation. Images and descriptions with quantitative scales of the quality of visual targets at known distances will be disseminated to users in real-time. An example is a maritime application in the vicinity of bridges, which can represent a significant hazard to navigation in limited visibility situations. The system would provide an image and the quantitative visual description of bridge support pilings, bridge deck lamp posts, range markers, navigation lights, and other visual targets. Long-term, unattended operation with calibration stability, and real-time reporting capabilities are required. The system must be weatherproof and operational under all weather conditions. It should operate at 12 VDC with a sleep mode. Minimal data update interval is 6-minute. Sensor output should be capable of interface with commercial data communication devices such as RS-232 ports, telephone, wireless phone, line-of-sight radio, or over the Internet.

8.2.2R Subtopic: Measuring Depth Profiles of Scattering in the Ocean

The Environmental Technology Laboratory is developing laser radar, or lidar systems using short laser pulses to measure depth profiles of scattering in the ocean. The use of a short pulse provides good depth resolution as long as the receiver has sufficient bandwidth. Because of the high attenuation in the ocean, a large dynamic range is also required to penetrate to the depths of interest. For our purposes, we would like to have >80 dB of dynamic range with a bandwidth of 0 to 500 MHz and a sample rate of 1 GHz. Continuous throughput at this rate is not required for this application; a burst of 10000 samples every 10 ms is adequate. Possibilities include, but are not limited to, development of a log-amp that can be used with an available 8-bit digitizer, development of an 8-bit digitizer with logarithmic response over 80 dB, and development of a high-speed, 16-bit digitizer. Compatibility with a standard personal computer is most useful for our application, and would likely have a larger commercial market.

8.3 TOPIC: 8.3 LIVING MARINE RESOURCES

8.3.1F Subtopic: Diagnostic Tools for Disease Management

Development of marine species protein-gnomic veterinary diagnostics tools to aid propagation and disease management of complex environmental and anthropogenic stressors in farm level marine aquaculture.

References:

Sea Grant Biotechnology Project:

An Integrated Molecular Biomarker System to Assess and Compare the Health of Aquatic Life in Washington State Waters http://www.ocnms.nos.noaa.gov/research/biotech.html

Center for Coastal Environmental Health and Biomolecular Research (CCEHBR). http://www.chbr.noaa.gov/

Fort Johnson Marine Science Seminar Series http://www.chbr.noaa.gov/FTJSS Spring01.html

Downs et al., 2000. Mar. Biotechnol. 2, 533-544; Downs et al., 2001. J. Exp. Mar. Biol. Eco. 3657.

8.4 TOPIC: OCEAN SCIENCE

8.4.1SG Subtopic: Aquaculture: Developing and Improving Species Culture

Proposals are requested for research which offers to make significant, industry-wide improvements in finfish, shellfish, and ornamental fish culture systems for both small scale and large scale applications. Priority will be given to research which finds innovative approaches that will solve major industry bottlenecks in an economically and environmentally compatible manner. Research aimed at new species for culture and research to adapt techniques being used successfully in other countries are appropriate.

8.4.2SG Subtopic: Aquaculture: Water Reuse and Effluent Treatment Systems

Proposals are requested for developing integrated aquaculture systems with minimum impact on the environment. These include development of innovative water reuse systems for ponds and raceways and other novel systems for treating effluent. Special priority will be given to prototype, modular water reuse systems suitable for producing a variety of species anywhere in the United States.

8.4.3SG Subtopic: Aquaculture of Marine Organisms for Marine Natural Products

Research in the past two decades has found that there are many marine organisms which produce novel natural products of use in treating human diseases. To utilize these products commercially and in clinical trial, however, they need either to be chemically synthesized, produced using biotechnology, or produced through aquaculture of the organism. Research is needed to find economically cost-effective and biologically viable ways to culture marine organisms specifically for their production of novel natural products.

8.4.4SG Subtopic: Open-Ocean Aquaculture Systems

Both engineering and biological technology needs to be explored for the development of open-ocean or offshore culture systems. Large scale, offshore, submersible and floating systems need to be developed for Atlantic, Gulf of Mexico and Pacific conditions. Automation of feeding and harvesting functions as well as telemetry and remote control systems will be considered in this competition. The biological technology would include hatchery, nursery and transport systems for candidate species for open ocean-aquaculture. Field tests of candidate species are encouraged.

8.4.5SG Subtopic: Disease Diagnostics and Controls

Given the severe problems with aquaculture disease diagnostics and controls, we seek proposals in those areas in order to reduce the impacts on the US aquaculture industry.

8.4.6SG Subtopic: Aquaculture Industry Engineering

NOAA, in keeping with DOC Aquaculture Policy, is seeking proposals related to aquaculture engineering and equipment to support the industry. Specifically for this call, we are looking for improved designs for underwater feeders, shrimp de-heading devices, large scale production systems, and harvesting devices.

8.4.7SG Subtopic: Rapid and Automated Methods to Detect and Quantify Harmful Algae and/or Their Toxins

Detection of harmful algae and their toxins in discrete water samples is critical for the prevention, control, and mitigation of harmful algal blooms. The objective is to develop rapid, cost-effective, automated methods for the identification, detection, and quantification of harmful algae species/strains and/or their toxins in coastal ecosystems.

8.4.8SG Subtopic: Development of Computer Simulation Models for Sediment Transport for Port and Harbor Applications

As a consequence of increased understanding of hydrodynamic phenomena and the widespread availability of sophisticated graphical software and high speed computing facilities, the systematic study and reliable prediction of hydrodynamic conditions in harbors is now possible. Studies pertaining to many of these conditions were, until now, beset by oversimplification. It is now possible, for instance to develop sophisticated, practical, and reliable wave prediction models for harbor applications that include realistic physics and boundary conditions. This initiative seeks to provide greater understanding and new models for many harbor-related phenomena. While stringent environmental laws inhibit the introduction of contaminated material on the seabed, waves induced by local wind or by boat traffic can resuspend (the frequently contaminated) sediments on the seabed. This influences the dispersal of settled material, including mounds of dredged material or other material from past deposits.

Resuspension and transport of fine suspensions is hence of immense importance to both the maintenance of navigation channels and to the environmental water quality. NOAA is interested in developing models for predicting their dispersal (by waves and currents induced by winds and tides), for all harbors, and assess the potential environmental consequences of sediment transport and redistribution resulting from port improvements.

8.4.9SG Subtopic: Develop Computer Models/Simulations to Estimate Vessel Hydrodynamics

Ship hydrodynamics in channels, restricted waters and in the presence of other ships: Ship-induced disturbances lead to high cost for maintaining and repairing the sea walls and/or beaches, and small coastal structures, in addition to mobilizing sediments on the seabed. Regulating and scheduling shipping and ferry traffic require quantitative modeling of sea states generated by this traffic. NOAA is interested in developing new theories and computational models for multiple moored ships in harbors and the transient responses of moving ships on one another. The models can be used to predict the effects on banks and shores to guide designs for wave absorbers, reflectors, etc.

8.4.10SG Subtopic: Develop Models for Improving Vessel Navigation Within Ports and Harbors

The likelihood of collisions between ships and fixed structures or other ships varies greatly with the geometry of the obstacle and the waterway, the type of maneuver, the characteristics of the vessel, the experience of the captain, the traffic density, and environmental conditions such as visibility, currents and waves. New theories and methods to study the safety of harbors from a system perspective need to be developed. These include models producing synthetic ship trajectories and new generation ship motion simulators which can integrate data associated with ship type, channel bottom/side topography, environmental (wind and current) input, and navigational and human factors in order to produce appropriate tracks as the ships transit through a channel or waterway.

8.4.11SG Subtopic: Develop Computer Models/Simulation for Economin Design of Navigation Channels

For a given density of vessel traffic, the design process navigation channels involves minimizing construction and maintenance costs and the cost associated with expected casualties. These are dependent on various design and operating parameters (e.g. channel geometry, configuration of turns, vessel escort requirements and navigation aids, etc). The design process is often hindered by the fact that great uncertainty accompanies these costs. The development of new methods, including probabilistic methods based on synthesizing existing data, is needed. The goal is to develop new tools for improved estimation of project costs, including initial construction and future maintenance (as a function of channel dimensions, type of material, silting rates, etc.), casualty costs, and costs pertaining to natural resource damage.

8.5 TOPICS: Cartography, Photogrammetry, Hydrography, and Geodesy

8.5.10 Subtopic: Cartographic Data and Geographic Information Systems (GIS)

Innovations with commercial potential are sought incorporating new and emerging technologies related to digital cartographic and GIS systems to support National Ocean Service (NOS) requirements. The NOS makes its products, data, and metadata available to agencies, academia and the public through electronic access via computer networks. Needed research critical to the NOS mission includes:

- a) New methods for generation, update, and transfer of geo-data products and data files from spatial data bases, including raster images, to meet emerging requirements of Electronic Chart Display and Information System (ECDIS) and similar shipboard electronic navigation systems using raster displays.
- b) User-transparent approaches to geo-data and geo-processing interoperability across networks (e.g., the Internet), for Software Interoperability: Automatically invoked platform independent processing functions; and Data Interoperability: User-transparent autonomous standard file format conversions.
- c) Innovations for easily locating, accessing, searching, transferring, reformatting, and portraying geo-data and GIS graphic products across networks. These could involve knowledge processing via expert systems and/or neural nets, hyper-links (e.g., Netscape-like), geospatial search engines, or improved conventional techniques.
- d) New methods for enhancing/compressing raster images of nautical chart features, including text and feature symbology. These can range from conventional image processing and optical character recognition algorithms to the use of expert systems, fuzzy logic, neural nets, and specialized pattern recognition/matching algorithms.
- e) Improved methods for error-free raster-to-vector and vector-to-raster conversion/compression for digital raster images, including semi-automated GIS data attribution and metadata generation directly from the vectorized raster data files.
- f) Heads-up raster and vector navigation and nautical charting data shown in two and three dimensional displays for mariners. Such practical information could be shown on (semi-)transparent, portable, heads-up displays superimposed in novel ways on the actual environment to help mariners navigate, especially in conditions of limited visibility.
- g) A comprehensive method for remote real-time monitoring of navigation channel depths to within 1 foot and widths to within 10 feet throughout the entire channel length (1 mile to 100 miles). The method must be comparable in cost to the periodic sonar surveys currently in use. A "survey" by this method should require 24 hours or less, if possible.

8.5.20 Subtopic: Hydrographic Survey Technology

Recent advances in, and the widespread use of, shallow water multibeam systems have proven that historical correction techniques for sound speed are not sufficiently dense in spatial and temporal dimensions for the present and future technology. The acoustics have, in short, out-propagated the knowledge of the water column. Development of new methods of determining the acoustic path of sound produced by modern transducers in the frequency range of fifty to five hundred Hertz (50-500 Hz) and depth ranges of five to five hundred meters is desired. The technology may be based on direct measurement using small, retrievable sensors, similar to the ARGO floats used in the Global Ocean Data Assimilation Experiment (GODAE) (http://www.bom.gov.au/bmrc/ocean/GODAE/), or through innovative approaches to determining the speed and direction of propagation of sound. The goal of this research is to reach a true, non-interpolated, near-real time. array of corrections which would be equivalent to traditional sound speed vertical profiles conducted on a grid size of one kilometer or less. The product must also have inherent data management and visualization tools to allow application of the corrections to multibeam soundings and to provide the user with predictive tools for changes in the water column that may affect overall survey accuracy.

8.5.30 Subtopic: Airborne Gravity Measurement System

Airborne gravity provides better coverage and faster and more complete data acquisition than land-based measurements. This is especially important in coastal regions where gravity knowledge is limited due to the lack of airborne instrumentation. Airborne gravimetry also makes is possible to map harsh and rugged terrain that is difficult to access on the ground. There is also a great potential commercial benefit for the oil/gas exploration market. Currently airborne gravity measurements are limited to spring-type instruments that suffer severe problems of drift, calibration, and tares. These disadvantages can be overcome by adapting land-based absolute gravity technology together with improved measurements of aircraft accelerations using Global Positioning System (GPS). This makes for an attractive instrument development track.

9.0 SUBMISSION FORMS

9.1. NOAA/SBIR COVER PAGE

PROPOSAL NUMBER:

Proposal to Department of Commerce COVER PAGE					
PROGRAM NOAA/SBIR - SMALL BUSINESS INNOVATION RESEARCH		This firm and/or Principal Investigator has has not submitted proposals for essentially equivalent work under other federal program solicitations, or has has not received other federal awards for essentially equivalent work.			
SOLICITATION NO.:					
NOAA 2002-1	NOAA 2002-1 January 16, 2002				
NAME OF SUBMITTING FIRM TAXPAYER IDENTIFICATION NUMBER				MBER	
ADDRESS OF FIRM (INCLUDING ZIP CODE +	- 4)		·		
TITLE OF PROPOSED PROJECT					
REQUESTED AMOUNT	PROPOSED DURAT	ION			
\$	6 months				
SOLICITATION SUBTOPIC NO.	ICITATION SUBTOPIC NO. SOLICITATION SUBTOPIC TITLE				
THE ABOVE ORGANIZATION CERTIFIES THA	<u>I</u> AT:			YES	NO
It is a small business firm as defined on page	3.				
2. The primary employment of the principal inves	2. The primary employment of the principal investigator will be with the firm at the time of award and during the conduct of the				
3. A minimum of two-thirds of research will be performed by this firm in Phase 1.					
4. It Qualifies as a minority and disadvantaged sn	4. It Qualifies as a minority and disadvantaged small business as defined on page 4.				
5. It qualifies as a woman-owned small business a	· -				
6. It will permit the government to disclose the title and technical abstract page, plus the name, address and telephone number of the corporate official if the proposal does not result in an award to parties that may be interested in contacting you for further information or possible investment.					
PRINCIPAL INVESTIGATOR/ PROJECT DIRECTOR		ATE OFFICIAL SINESS)	OTHER INFORMA	ATION	
NAME	NAME		YEAR FIRM FOUNDED		
SIGNATURE	SIGNATURE		NUMBER OF EMPLOYEES Avg. Previous 12 mos. Currently		_
TITLE	TITLE		HAS THIS PROPOSAL BEE SUBMITTED TO ANOTHER Yes No		Y?
DATE TELEPHONE NO. + AREA CODE	DATE TELEPHON	E NO. + AREA CODE	IF YES, WHAT AGENCY?		
E-MAIL:	E-MAIL:				
	PROPRIET	ARY NOTICE			

For any purpose other than to evaluate the proposal, this data shall not be disclosed outside of the Government and shall not be duplicated, used or disclosed in whole or in part, provided that if a funding agreement is awarded to this proposer as a result of or in connection with this submission of this data, the Government shall have the right to duplicate, use, or disclose the data to the extent provided in the funding agreement. This restriction does not limit the Government's right to use information contained in the data source without restriction. The data in this proposal subject to this restriction is contained on separate proprietary page(s).

9.2 NOAA/SBIR SUMMARY FORM

NAME OF FIRM		AMOUNT REQUESTED
ADDRESS		PHONE #
		FAX#
		17001
PRINCIPAL INVESTIGATOR (NAME AND TI	TLE)	
TITLE OF PROJECT		
SOLICITATION SUBTOPIC NO.	SOLICITATION SUBTOPIC TITLE	
TECHNICAL ABSTRACT (LIMIT TO 150 WO	DRDS)	
SUMMARY OF ANTICIPATED RESULTS		
POTENTIAL COMMERCIAL APPLICATIONS		

9.3 NOAA/SBIR PROPOSAL SUMMARY BUDGET

FIRM:	PROPOSAL NUMBER: (Leave Blank)	
PRINCIPAL INVESTIGATOR:		
DIRECT LABOR:	TOTAL PRICE \$	
OVERHEAD RATE:	\$	
OTHER DIRECT COSTS:	\$	
MATERIALS:	\$	
GENERAL AND ADMINISTRATIVE (G&	A): \$	
PROFIT:	\$	
TOTAL PRICE PROPOSED:	\$	
TYPED NAME AND TITLE:	SIGNATURE:	
THIS PROPOSAL IS SUBMITTED IN RESPONSE TO NOAA SBIR PROGRAM SOLICITATION 2002-1 AND REFLECTS OUR BEST ESTIMATES AS OF THIS DATE.		
	DATE SUBMITTED:	

9.3.1 NOAA/SBIR BUDGET INSTRUCTIONS

The offeror is to submit a cost estimate with detailed information for each element, consistent with the offeror's cost accounting system. This does not eliminate the need to fully document and justify the amounts requested in each category. Such documentation should be contained, as appropriate, on a budget explanation page immediately preceding the budget in the proposal.

1. Principal Investigator (PI).

The PI must be with the small business concern at the time of contract award and during the period of performance of the research effort. Additionally, more than half of the PI's time must be spent with the small business firm during the contract performance.

2. Direct Labor.

All personnel (including PI) must be listed individually, with the projected number of hours and hourly wage.

3. Overhead Rate.

Specify current rate and base. Use current rate already negotiated with a Federal agency, if available. If no rate has been negotiated, a reasonable overhead rate (10-15% is a verage) may be requested, which will be subject to approval by NOAA.

4. Other Direct Costs.

List all other direct costs which are not described above (i.e. consultants, sub-contractor, travel, and equipment purchases). Each of the above needs a detailed explanation and elaboration of its relation to the project. (Up to \$4,000 may be allocated for technical and commercial assistance.)

5. Materials.

The materials and supplies required for the project must be identified. There is also a need to specify type, quantity, unit cost, and total estimated cost of these materials and supplies.

6. General & Administration (G&A).

Specify current rate and base. Use current rate already negotiated with a Federal agency, if available. If no rate has been negotiated, a reasonable G&A rate may be requested, subject to approval by NOAA.

7. Profit.

The small business may request a reasonable profit (about 7 percent of costs is the average proposed).

10.0 NOAA/SBIR CHECKLIST

Please review this checklist carefully to assure that your proposal meets the NOAA requirements. Failure to meet these requirements may result in your proposal being returned without consideration. Six copies of the proposal must be received by Noon EST January 16, 2002.

1.	The proposal is 25 PAGES OR LESS in length.
2.	The proposal is limited to only ONE of the subtopics in Section 8.
3.	The proposal budget is for \$75,000 or LESS (or \$50,000 or less for those subtopics designated as "SG"). No more than one-third of the budget goes to consultants and/or subcontractors.
4.	The abstract contains no proprietary information and does not exceed space provided on the Project Summary.
5.	The proposal contains only pages of 21.6cm X 27.9cm size (8 ½" X 11").
6.	The proposal contains an easy-to-read font (fixed pitch of 12 or fewer characters per inch or proportional font of point size 10 or larger) with no more than 6 lines per inch, except as a legend on reduced drawings, but not tables.
7.	The COVER PAGE has been completed and is PAGE 1 of the proposal.
8.	The PROJECT SUMMARY has been completed and is PAGE 2 of the proposal.
9.	The TECHNICAL CONTENT of the proposal begins on PAGE 3 and includes the items identified in SECTION 3.3.3 of the solicitation.
10.	The SBIR PROPOSAL SUMMARY BUDGET has been completed and is the LAST PAGE of the proposal.
11.	The P.I. is employed by the company.

NOTE: Proposers are cautioned to be careful of unforeseen delays that can cause late arrival of proposals, with the

result that they may be returned without evaluation.

11.0 SBIR NATIONAL CONFERENCES

FEDERAL R & D OPPORTUNITIES FOR TECHNOLOGY INTENSIVE FIRMS

Sponsored by:

Department of Defense/National Science Foundation In Cooperation with All Federal SBIR Departments and Agencies

- Marketing Opportunities for R&D and Technology Projects with Federal Agencies and Major Corporations.
- Techniques and Strategies for Commercializing R&D through Venture Capital, Joint Ventures,
 Partnering, Subcontracts, Licensing, and International Markets.
- Management seminars in Marketing, Business Planning, Starting and Financing Small Technology
 Firms, Procurement, Government Accounting and Auditing.
- Agency and company exhibits and/or One-on-One tables will be open for networking opportunities for all attendees!

RAPID CITY, SD OCTOBER 23-26, 2001

ANAHEIM, CA MARCH 11-14, 2002

BUR LINGTO N, VT OCTOBER 28-31, 2002

ALBUQUERQUE, NM MARCH 11-14, 2003

For registration or further information:

SBIR Conference: (360) 683-5742

SBIR Homepages: http://www.SBIRworld.com

http://www.zyn.com